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ABSTRACT

This report describes courseware for comprehensive computer-assisted testing and instruction. With this program, a personal computer can be used to: (1) generate multiple test versions to meet test objectives; (2) create study guides for self-directed learning; and (3) evaluate student and teacher performance. Numerous multiple-choice examples, drawn from a legal studies curriculum at Fanshawe College, London (Ontario), Canada, illustrate ten difficulty levels, ranging from a simple true/false choice (at Level 1) to a complex choice of two or more correct statements from a list of five or more statements (at Level 10). Four sample printouts show supplementary information provided to teachers. Addenda A prints student grades and individual responses to test items. Addenda B tabulates a statistical summary of class performance. Addenda C displays for each question the number of students choosing each possible answer, and, to detect any response bias, the number choosing A, B, C, and so forth across all test items. Addenda D reports a difficulty index, a discrimination index, and a measure of distractor effectiveness for each question. A bell curve can also be produced. Sample questions from philosophy, sociology, and business-related disciplines are offered, along with a case study suitable for adaptation to a home telecourse. (LPG)

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Computer Assisted Learning AND Evaluation

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There are a number of Test Generators which have been developed for testing and evaluation.

There are numerous teachers' manuals which include banks of multiple choice items.

This manual describes a program and methodology which encompasses both of the above, but goes much farther as follows:

Objective questions are generated in near infinite numbers from banks of statements.

The program identifies the book, chapter, and unit of study from which the questions are created, and on command, selects the statements at random from the files and assembles them into questions.

The program provides for eight basic levels of difficulty but compounds these, as directed, into hundreds of gradations of taxonomy.

It creates test material mechanically in progressively comprehensive modes which may form the basis for sophisticated studyguides which are not available otherwise except at enormous cost.

Tests can also be created in the same sophisticated manner.

It can utilize case-studies, charts and diagrams, schematics and other graphic illustrations in the same progressively comprehensive manner.

It is a completely unique and sophisticated methodology.

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COMPUTER ASSISTED LEARNING AND EVALUATION

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PREFACE - WHAT CAN BE DONE WITH THE COMPUTER

It is presently possible to have a test created by a computer, from questions created by a computer, from data supplied to the computer by an author/teacher.

The writer can demonstrate the foregoing by using an ordinary PC/Word Processor with an inexpensive printer, all of which may be purchased for less than $3000 on today's market.

At the present time, the word processor/computer can produce multiple choice tests and study guides based on pre-set criteria as follows:

a) Directly related to a specific book, chapter and unit of study, as required.

b) According to a scale of taxonomy, or difficulty level, ranging from 1-10, but which may be compounded so as to produce an actual range of taxonomy of near infinite gradations.

c) The teacher may require that the questions will test general knowledge, theory, skills, mechanics, procedures, deductive reasoning, and problem analysis.

d) The program can specify the percentage of questions or statements to be taken from any specific unit of study and thereby "weight" the tests.

e) A copy of the test will be printed showing not only the questions, but also the answers, and the source of each of the statements which form part of the questions. This copy will identify the book, chapter, unit of study, and statement number.

f) A second copy of the test will be printed showing the questions without answers or sources.

g) By using permutations and combinations the potential number of tests and questions approaches infinity.

h) The system is remarkably flexible and can be used to produce not only tests as described above, but may also be used to develop study guides in which the questions may become increasingly comprehensive by retaining some questions from earlier units of studies while adding questions progressively from subsequent units of study. The idea is to proceed from the simple to the complex; from the known to the unknown.

By using case-studies as part of a workbook or study guide,

the student can be directed to apply the knowledge gained in the lessons. Questions can be based on the case-studies in the same increasingly comprehensive and complex way as for the lessons or units of study themselves.

Flow-Charts, diagrams, schematics, illustrations of all kinds, and even complicated mathematical problems and formulae can be presented in the same way.

i) Team-teaching can be significantly enhanced by integrating each specialized presentation to the others as above, and by designing case-studies which expand to include problems based on each specialized unit of study as it is presented. An example of this may be found in the case-study at the end of this manual, called "The Keewatin Incident."

j) The methods and mechanisms described in the context provide a significant step toward effective self-directed learning. Study guides and case-studies can be tailored to individual or small group needs, and the mechanisms now available make this economically feasible.

A note of caution should be injected here, however, because the danger exists that the real educational value of this technology may be lost if the objective of the user is to produce inexpensive volume as opposed to carefully constructed resources that can be produced with variations which will avoid mechanistic presentation and rote learning.

k) The improvement of self-directed learning leads to improvements in facilities for disadvantaged or handicapped persons who are either confined to their homes or are limited as to their mobility. In many cases, where persons whose access to learning is restricted by the remoteness of their location, they can be brought into direct contact with these resources with relatively small cost. If a telephone is available, they need only a modem and an inexpensive word processing setup in order to access what can be a vast educational facility.

l) "Table-top" publishing can create resource material which may also be accessed by modem and reproduced as needed by the user. Learning resources can, thereby, be made available using a "shopper's mart" concept as a marketing device. A catalogue of resources can be made available through the computer, and the user may then select the combinations of units of study which meet his/her individualized needs as set out in course outlines. They can be reproduced under licensing arrangements and printed locally in quantities as may be required.

m) These resources can be made available from central sources to any user, whether that be a person, corporation, educational

institution, certifying body, or government agency, by using the technology as described above and which is available for less than a four thousand dollar capital investment.

n) In this era of rapidly expanding technology and automation, the need for retraining becomes inevitable. In many cases the candidate has achieved advanced standing in the school of hard knocks, but has very little formal qualification. In order to assess a candidate's entry level, the availability of computerized testing on demand has obvious advantages. The individual can be provided with study-guides and resource material, and when he/she wishes to write a test to determine the level that has been reached, the opportunity is readily available. Repeat attempts are also economically available.

   The same can be said about persons who may need to pick up a prerequisite to qualify for a program of studies.

o) For the protection of society, governments are finding it to be increasingly necessary to regulate service industry by requiring persons who represent themselves to have the knowledge and skills to advise or represent people, to prove their qualifications by meeting certain standards. A case in point is a recent bill presented to the Ontario legislature to qualify and regulate "paralegals." Some persons have been practising as such for decades. Computerized testing, as described in this manual, can go a long way toward determining existing standards by which qualifying standards may be established. Having made this determination, the qualifying agency can then adjust the standards as may be requisite to suit their purposes.

   Refresher courses and upgrading facilities are much more accessible to persons in all parts of the territorial jurisdiction of the licensing agency.

p) Integrated learning and testing by which related subjects are tied in to the main course of study is more easily accomplished when a study-guide and tests are generated by computer. For example, if the primary objective of a course is an understanding of the principles of marketing, the secondary objectives would include an understanding of the influences created by laws, economic conditions, sociological conditions and psychological factors, to mention only a few prominent ones. Our computer program can create study-guides which would draw questions from all of these areas of study and weight the degree of imput as the teacher directs. The teacher becomes rather like a composer-arranger-conductor who seeks the most harmonious imput from the instruments in his orchestra.

q) On completion of a test by students, it may be marked by computer. The results, and a complete analysis, can be made available within the hour.

SOME ADVANTAGES AND DISADVANTAGES OF COMPUTER TESTING

Valid testing is the sine qua non of effective teaching and it is therefore important to assess the validity of multiple choice tests created by word processors/computers. Toward this end, the writer has compared the results of tests based on the foregoing format, with the results of tests based on more conventional essay-type and short answer-type formats. Comparisons were made over a period of more than 15 years, but they were not done in any formal manner in the sense that data from specific research is available. This is not to suggest that research in this field has not been done by others; it is simply a statement of the writer's experience. The comparisons made, show that the actual marks or grades bear a remarkable similarity or correlation as between the two testing formats mentioned.

I do not suggest that computerized testing should be adopted to the exclusion of all other methods of testing, and in fact this writer holds the contrary view. I will not attempt here to compare the various pedagogical methods available for teaching either in law or generally; instead, I advocate the use of this method of testing as a way of effecting extraordinary economies with respect to the cost of education, while retaining quality.

The method has further advantages, including immediate feedback, total objectivity, standards consistency, ease of maintaining student records, ease of accessability to records of student progress, and greatly increased test security, to mention only the obvious advantages.

Although the writer's teaching experience is limited to public legal education, the computer program which my associates and myself have developed is easily adaptable for use in other disciplines and has been adapted to a number of other disciplines.

Some examples are provided in the addenda, but many others are available for examination on request.

In addition to what has been described above and what follows in the context of this brief, the writer is developing programs which will enable students in the future to requisition tests individually, write such tests, and have them evaluated immediately. The result of the test or tests would be stored in the computer files in order to keep a record of these students' progress and accomplishment. The ultimate goal would be to make it possible for all persons to proceed toward accreditation at their own speed in accordance with their own needs and exigencies.

The objective is not to have computers replace teachers, because, in my opinion, this is probably not possible, and in any event, is not desirable. I envision the role of a teacher as being one of a counsellor, a resource person, and, of course, as a monitor of the contents of the computer programs and teaching resource materials.

With the existing facilities, it is quite possible to provide tests on demand without any great inconvenience to either the teacher or the administration. It is my present practice to allow students to write as many tests as they wish and to give them credit for their achievement regardless of how many tests he/she may have written. Upgrading should never be withdrawn as long as the student wishes to make the effort. It would be logistically impossible to provide this accommodation for students if it were not for the fact that my program substantially reduces the drudgery of creating questions, and tests, and of marking them.

Because of the potential number of variations, I have no concern about the students keeping their copies of the tests; as was indicated in the preface, the number approaches infinity. In fact, I encourage the students to keep their copies as part of their notes for study and review purposes.

The ease with which tests are created and the consistency of their taxonomy also make it possible to have a large number of students write a test in the same room, but with a number of variations which will make it futile for students to signal answers back and forth.

I dislike the role of judging who shall pass and who shall fail, both because I have never been so confident of evaluation methods and techniques that I believe they are always accurate and fair; and also because I prefer to leave an option open to students to improve their grades by their own efforts. By making the opportunity for rewrites, or upgrading tests, available on demand, the student becomes much more the author of his own fate. I believe that this is as it should be, and that the option for upgrading should never be withdrawn as long as a student wishes to make the effort. It is much easier to achieve this ideal when computer testing is available.

What follows is a rationale and illustration for the claims which have been made.

THE TAXONOMY SCHEME

The primary purpose of establishing criteria for taxonomy or difficulty level is to enable the teacher or the educational institution, or a licensing body, to meter the standards of achievement required for the successful completion of a course or program of studies. The taxonomy scheme which I have devised is really just the beginning of the research and experimentation which will be necessary to bring the techniques described here to their greatest potential. At the present time it is in a transitional stage.

In order to create questions for tests to meet a specific standard it is necessary to do considerable field testing for the purposes of determining what standards exist at any given time, either in the educational institution, or in the industry, or in a profession. I believe that the mechanism for determining standards is substantially enhanced by the program and concepts that I advance.

Although the criteria for the taxonomy scheme which I use are subject to revision after field testing, I believe they are satisfactory for the present purposes. Examples of the taxonomy levels which follow may be found, starting at page 7.

1. Level-One Questions are straight correct/incorrect statements coming from a specific file, or unit of study.

2. Level-Two Questions are also correct/incorrect statements but a third dimension is added whereby the student is also required to identify whether a question can be answered in its present form, or whether it should be marked "insufficient data."

3. Level-Three Questions require students to choose which is the most correct or incorrect from 3 statements.

4. Level-Four Questions require students to choose which is most correct or incorrect from 4 statements.

5. Level-Five Questions require students to choose which is most correct or incorrect from 5 statements.

6. Level-Six Questions require students to choose which 2 of 5 statements are most correct or incorrect. The choices are in sequence and the students therefore choose which combination is correct knowing that the correct choices must be in sequence.

7. Level-Seven Questions require students to choose a combination of 3 correct or incorrect statements which will be in sequence as in Level Six.

8. Level-Eight Questions require students to choose 2 correct or incorrect statements which are not necessarily in sequence.

9. Level-Nine Questions require students to choose 3 correct or incorrect statements which are not necessarily in sequence.

10. In Level-Ten Questions students must choose 2 or more correct or incorrect combinations of statements which are not in sequence and the number of statements will exceed 5.

Levels Six and Seven enable a student to use "part knowledge" by exercising deductive reasoning. If a student knows that a statement is either correct or incorrect, he/she may eliminate illogical combinations and thereby reduce the number of logical answers; i.e., make an educated guess. Part knowledge is thereby rewarded.

The difficulty levels may be compounded by drawing the statements from two or more files or units of study, thereby requiring that the student have a broader knowledge of the subject in order to answer the questions. For example, a five statement question may be drawn from five different chapters, or it may be drawn from five different units within the same chapter, which would be a less difficult question. The use of case studies, as described later in the text, creates a mechanism for tests that require a broader knowledge of legal theory and practice. Some of the example questions shown in pages following are, in fact, more difficult than simple level questions drawn from the same unit of study. At this stage, I have not attempted to program for these gradation's of taxonomy, but there is no apparent reason why it could not be done. The question is whether such fine distinctions are necessary.

It bears repeating that considerable field testing based on actual results of tests administered in controlled circumstances is necessary in order to validate the criteria set out above.

EXAMPLE QUESTIONS

The following are examples of questions to illustrate both the taxonomy levels and some different types of testing objectives such as substantive knowledge, theory, or procedural skills that may be tested. The case-study methods referred to above are also illustrated. A description of testing objectives follow the sample questions.

Taxonomy Level

Level One. The Constitution Act (1867) was enacted by The Fathers of Confederation. (T) or (F) (it is false)

Level Two. The Constitution Act was enacted by the Parliament of Canada (T) or (F) or Insufficient Data.

If a statement is true, the students answer "A" on the computer card, if false "B" and if insufficient Data "C", which in # Two is correct, because there are two "Constitution Acts which make up our constitution; the B.N.A. Act of 1867 which was renamed, Constitution Act, 1867, and which was enacted by the parliament of Britain; and the Constitution Act, 1981, which was enacted by the parliament of Canada.

The foregoing sample questions illustrate testing for general knowledge, but the following level two questions illustrate testing for other objectives.

(1) A spouse is entitled to "equalization" under the Ontario Family Law Act of 1986.

This question tests a knowledge of substantive law, but it also tests the ability of the student to identify the fact that the word "spouse" in this context may mean a legally married person, or it may mean a "common law" spouse. The former is entitled to equalization of assets. The latter may be entitled to maintenance and support, but is not entitled to equalization. The question must be answered "C" or "insufficient data" because of the ambiguity concerning the use of the word spouse. Lawyers and judges are like the Queen in Wonderland - "Words mean what I say they shall mean."

(2) The following is a logical sequence for the conduct of a law suit; Notice of Action, Notice of Intention to Defend, Pleadings.

The sequence is reasonably logical, but that depends on the type of lawsuit. The answer, therefore, must be "C". The question tests knowledge of procedures, ie. mechanics, and knowledge of the fact that there are different kinds of lawsuits requiring different procedural steps.

(3) Every dog is entitled to one bite.

This is a cliche which is frequently quoted by laymen. There is a grain of truth in it in the sense that the owner of a domestic pet may not be liable for its conduct, unless he was aware of its propensity for doing legally unacceptable things. There is an obvious absence of sufficient data upon which to base a conclusion, and again the answer is "C."

With a little ingenuity, we could base an entire test on a combination of level one and level two questions, or provide it as a study guide. You should, also, consider the potential for discussion and debate when the questions are taken up in class.

Level Three

WHICH OF THE FOLLOWING IS MOST CORRECT?

[B1C02U04.8]	An extradition treaty falls under the category of public law.	A - [F]
[B1C02U05.24]	Laws or rules enforced by administrative tribunals include public company resolutions.	B - [F]
[B1C02U02.1]	The "common law" system of justice was not adopted as part of the law of Quebec, in the same way as in Ontario.	C - [T]

This question was generated by computer and illustrates testing of general knowledge related to the sources of law.

Level Four

WHICH OF THE FOLLOWING IS LEAST CORRECT?

[B1C02U03.2]	The rules of equity are no longer part of Canada's legal system.	A - [F]
[B1C02U04.3]	Many of the rules in the Sale of Goods Act originated in mercantile courts.	B - [T]
[B1C02U05.4]	A decision of a provincial administrative tribunal may be reviewed as of right in the Divisional Court of Ontario.	C - [T]
[B1C02U01.6]	Statutes are initiated by a "bill" presented to the parliament or legislature which is, in effect, a draft of the statute.	D - [T]

This question illustrates testing of general knowledge related to sources of law, (statements A & B) and knowledge of procedures (statements C & D)

Level Five

WHICH OF THE FOLLOWING IS MOST CORRECT?

[B1C02U05.17]	A. The sole function of administrative commissions and tribunals is to rule on decisions made by civil servants.(general knowledge)	[F]
[B1C02U05.10]	B. The legislature delegates the right to make law, by statutes which give the cabinet the authority to pass regulations.	[T]
[B1C02U01.14]	C. Statutes and regulations are both created by parliament or legislatures.	[F]
[B1c02U02.12]	D. "Due Process" relates exclusively to procedures in civil courts.(legal concept)	[F]
[B1C02U03.10]	E. The Chancellor administered canon law.	[F]

Level Six

To answer Level Six questions students must choose which combination is most correct. (AB=A) (BC=B) (CD=C) (DE=D) (EA=E) The correct answer is combo CD and the answer to the question which follows is therefore, C.

WHICH COMBINATION OF THE FOLLOWING IS MOST CORRECT?

A. Any person charged with an offence has the right to be found not guilty unless it constituted an offence under international law. [ ]AB

B. Some Provincial Courts conduct appeals. [ ]BC

C. The Construction Lien Act is a provincial statute. [ ]CD

D A certificate of substantial completion which has been issued by a payment certifier has no effect until a copy of it has been published. [ ]DE

E. To release the accused on his own recognizance is compulsory under the Charter of Rights (1981) in cases of arrest. [ ]EA

It should be noted that students may eliminate some illogical combinations if they are sure of a statement or statements. Part knowledge is thereby rewarded. The question tests two units of study. ie. consumer protection law and residential tenancy law as of March 1987.

Level Seven

WHICH COMBINATION OF THE FOLLOWING IS MOST CORRECT?

[B2C05U01.20] 1. Both the Marriage Act and the Divorce Act are provincial statutes. [ ]ABC

[B2C05U03.15] 2. Separation for a period of 12 or more months is grounds for divorce. [ ]BCD

[B2C05U04.19] 3. A decree of divorce in an undefended action may be granted on the basis of affidavit evidence without the necessity of a formal trial. [ ]CDE

[B2C05U08.24] 4. The "Net Family Property" of both spouses must be calculated in order to determine a division of property between husband and wife. [ ]DEA

[B2C05U08.24] 5. "Net Family Property" is the total value of property owned by a spouse as at the date of termination of marriage. [ ]EAB

Combination (ABC=A) (BCD=B) (CDE=C) (DEA=D) (EAB=E)

The correct combination is B,C,D and on the computer card the students should show "B" as the answer. Again, a knowledge of one or more of the statements will enable a student to eliminate illogical combinations and thereby arrive at the correct answer by the use of deductive reasoning. The questions are based on the federal Divorce Act of 1986 and the Ontario Family Law Act of 1986.

The Questions which illustrate levels 3, 4, 5, 6, and 7 were generated by the computer to show which of the statements are correct or incorrect, and also to show the source of the statements. This data is available for the teacher when completing the proof card by which the student cards are marked. The data also enables the teacher to direct the students to the source of the statement. B1 C02 U02 . 3 means Book One, Chapter Two, Unit Two, Statement Three. The computer can produce the identical question without this data for use in the actual test.

Level Eight

WHICH TWO OF THE FOLLOWING ARE MOST CORRECT?

A. In the event of arrest or detention, everyone has the right to be released by way of Habeas Corpus if the detention is not lawful. [T]

B. The Canadian Constitution fixes the term of a parliament or a provincial legislature at exactly five years. [ ]

C. The Canadian Charter of Rights does not specifically provide protection of the democratic right as to eligibility to run for a public office. [ ]

D. A Statement of Defence is most likely to be part of the procedures in a civil case. [T]

E. The Divisional Court would most likely hear appeals from a case starting in the Bankruptcy Court. [ ]

Level Nine

WHICH THREE OF THE FOLLOWING ARE MOST CORRECT?

A. A "Libel" case for $1,000,000 would most likely be tried in the Supreme Court of Ontario (Trial Division). [T]

B. Provincial Judge's Court would have jurisdiction to try a "Break and Enter" charge, if the accused so elected. [T]

C. Most business failures occur after the business has been operating for five years. [ ]

D. The Federal Court of Canada has jurisdiction to try a charge which alleges a breach of the Federal Combines Investigation Act. [ ]

E. If a plaintiff's damages in a case based on the faulty design of an automobile were $100,000, the District Court has the jurisdiction to conduct a trial if the defendant makes no objection. [T]

The answers for levels 8, 9 and 10 are not sequential and are, therefore, more difficult.

Level Ten

WHICH OF THE FOLLOWING STATEMENTS ARE MOST CORRECT?

a) An agreement to provide services without compensation is illegal. (False, it may be unenforceable)

b) Information given gratuitously but carelessly, and which turns out to be inaccurate, will give rise to an action for breach of contract if the person to whom the information was given relied on it to his detriment. (False, it would give rise to an action for tort). This is a very difficult distinction.

c) A decree of divorce may be granted solely on the basis of affidavit evidence. (True, because of the 1985 Courts of Justice Act)

d) "Special damages" are awarded in special civil cases only. (False, see note below)

e) The Supreme Court of Canada has no jurisdiction to conduct trials in criminal cases. (True, see note below)

f) Shareholders in business corporations are jointly and severally liable for unpaid corporation taxes. (False, shareholders' liability is limited to paying for shares which they purchase)

g) The test of the reasonable man may be used to determine culpability for armed robbery. (False, see note below)

The only correct statements are "c" and "e". This question is an example of a compound (two or more choices required) complex (knowledge of two or more areas of law is required) problem. It is therefore an extremely difficult question.

Statement "a" requires a knowledge of "consideration" as a requisite for an enforceable contract.

Statement "b" A combination of contract and tort law.

Statement "c" Procedural Law in divorce cases.

Statement "d" Remedies or compensation available in civil cases ("special damages describe specific out-of pocket expenses)

Statement "e" Jurisdiction of Courts (The Supreme Court does not conduct trials, it hears appeals)

Statement "f" A mixture of partnership law and the concept of limited liability for shareholders in corporations.

Statement "g" This requires a knowledge of the standards for judging negligence or carelessness in tort actions as opposed to criminal intent. It mixes substantive law and legal concepts.

This would be an extremely difficult question to put on a test at almost any level of legal education. I use it here to illustrate how the difficulty level of questions may be raised if a teacher chooses to do so.

TESTING OBJECTIVES

A. GENERAL KNOWLEDGE TESTING

Under this category we place questions which are based on definitions, sources of law, legal research, organization of courts including courts' jurisdiction, and a variety of other background data that a student must be familiar with in order to understand the theories of law, and the procedures for enforcing legal rights in courts.

B. TO TEST KNOWLEDGE OF SUBSTANTIVE LAWS AND THEORY

This type of questionning tests a knowledge of the substantive law as such, including legal concepts.

C. TO TEST SKILLS, MECHANICS, PROCEDURES

Many learning skills require actual "hands-on" experience in order to master them, and this, of course, cannot be tested by objective questions set by computer. For example, title searches or the actual preparation of documents require skills training. It is possible, however, to teach and test the preparation for manual skills by setting out the procedures and techniques which the students should follow. The test files for this type of question are kept separate from the substantive law questions, because it is probable that the mechanics of the practice of law will not be on course outlines except for legal secretarial programs or law clerk programs where these skills, techniques, and procedures must be learned. Although the files are kept separated in the sense that statements may be drawn from two separate banks of statements, nevertheless the computer program which my associates and myself have developed makes it possible to draw statements from both when composing questions. This would not be done ordinarily, but it would be for the programs mentioned above. The questions which will follow this section based on the case-study will serve to illustrate how different objectives are tested.

D. TO ASSESS DEDUCTIVE REASONING

In the explanation of the taxonomy scheme set out above, references were made to multiple choice questions with multiple answers or with combination answers, so it is not necessary to repeat a description of how students can use deductive reasoning and logic to arrive at answers which they might not otherwise be able to do.

The best legal arguments are based on logic and deductive reasoning and for this reason it serves a very useful purpose to teach such skills as part of legal studies, in addition to the fact that a mastery of logic is a valuable end in itself.

E. CASE STUDIES

As Vehicles To Teach And Test The Applications of Legal Theory And Procedures

The case-study, "The Trespassers," which follows, is an example of what I use to teach the applications of the skills and knowledge mentioned above. It is my practice to distribute copies of the case studies at the beginning of a course or at the beginning of a new unit of study along with instructions to the students that they should read the case study, analyze it, and attempt to identify the legal problems and issues which are created by the hypothetical fact situation.

This is actually an adaptation of the "moot-court" method of teaching law. The original purpose of this case study was to require the students to prepare and present legal argument on behalf of the fictional characters described in the case. This is very similar to what a lawyer actually does when he presents an argument to an appeal court, in the sense that the facts have already been established by the evidence given at the trial and with rare exception the appeal court judges will not second guess the findings of fact made by a jury, or a judge without a jury, at the trial. On appeal, the judges will hear arguments as to whether or not the law was properly interpreted and applied, and in the moot-court method of teaching law the students are required to simulate that practice.

The use of case studies for computerized testing has many of the advantages of the moot-court, in the sense that the most successful students will have identified the legal issues and legal problems by analyzing the facts, and will be prepared to answer questions based on them. It is quite possible that students will help each other, or work together for these purposes, and in fact I encourage them to do so because our primary objective is that they learn. The fact that they will learn from each other is not objectionable and should be distinguished from actual cheating during tests, when answers may be passed back and forth.

I have developed fairly long case studies (a copy of one is attached as addenda 2), which I can distribute at the beginning of a course, and use throughout the entire semester. This type of case study covers many legal issues and problems which I can discuss with the class during the presentation of the course and test them on various aspects of the case study from its beginning to its end. In effect, this becomes a step-by-step application of the knowledge and theories learned from the manuscript as it is covered in accordance with a course outline or statement of objectives. "The Trespassers" partly illustrates this theory because I use the steps that follow:

STEP 1. Identify the legal issues and legal problems.

STEP 2. Answer questions based on general knowledge such as which laws will be applied? which courts will have jurisdiction? which procedures will be followed; where can the student find references and resource material?

STEP 3. I now include questions based on the Canadian Charter of Rights and Freedoms with respect to the obligations of the arresting officer and the rights of the suspects. For this purpose, I require the students to understand the steps which would be taken to bring the suspects to trial from the beginning of the interrogation and arrest, to and including the trial itself.

STEP 4. The substantive law of torts and property rights, are involved in this case study and when these chapters have been covered in the text I add questions based on them to subsequent tests.

STEP 5. A further objective of this case study would be to apply the laws related to the legal remedies and sanctions which may be awarded or applied by the courts. Again, questions would be added in subsequent tests to evaluate the student's knowledge of these areas.

By following the practices described above, it is possible to test for specific objectives as they are reached under the course outline and at the same time to test for an accumulation of the objectives. It will be seen that subsequent questions become more difficult because they are more complex but this is not unlike teaching mathematics in the sense that simple arithmetic leads to complex algebra, or geometry, or trigonometry, etc., but they are learned in stages. We attempt to proceed from the simple to the complex; from the known to the unknown.

The case study methods add another dimension to teaching law which increases student interest very substantially. The case studies which I have developed are in most cases based on actual court cases with interesting facts. Some of these have been gleaned from newspaper reports of happenings that develop into court cases. I encourage my students to bring in newspaper reports of cases for discussion from time to time and I use them to illustrate the general knowledge and theories that have been presented in class in the same way that the case studies are used to test a student's ability to apply the knowledge acquired during classes.

"Adaptation of Ordinary Multiple-Choice Questions"

If you have already developed a bank of ordinary multiple-choice questions, they may be readily adapted for the format required by our computer program. The following illustrates how this may be done.

Which three of the following factors should be considered before instituting a civil action?

T A. legal remedies available and helpful
T B. probability of success versus possibility of failure and its consequences
T C. solicitor and client costs
F D. threatening a criminal prosecution
F E. your choice of judges

This question may be converted into T/F statements as in the following. The computer program then can re-assemble these statements, and others, by random selection, into the format illustrated in the text.

T (a) Legal remedies which are available and helpful should be considered before instituting a lawsuit.

T (b) Probability of success should be considered before instituting a civil lawsuit.

T (c) Solicitor and client costs should be considered before instituting a civil lawsuit.

F (d) You should consider threatening a debtor with criminal prosecution before instituting a civil lawsuit.

F (e) Your choice of judges should be considered before instituting a civil lawsuit.

THE TRESPASSERS

Case Study

Fanny Shawe, a student at UWO, was shopping in downtown London but could not find a public parking place. She found a space behind a store on Dundas Street where a sign was prominently displayed saying:

> " Private Property, No Parking, Trespassing automobiles will be towed away at owner's expense."

Fanny parked anyway, and ran into a bank, intending to be gone only ten minutes. She was delayed, and on returning to her auto, found it had been towed away by the G. E. Stoppo Towing Company.

She went to the towing company's lot but the proprietor, a Mr. G. O. Ring refused to give up possession of the car unless Miss Shawe paid $100.00 in towing and storage charges.

Miss Shawe returned late that evening with a friend named G. A. Lahad to retake possession of the car but Lahad waited outside until Fanny came back out. The lot was patrolled by an apparently vicious dog, which Fanny subdued with mace. Fanny then drove the car out but they were stopped by G. O. Ring a few blocks from the lot and held at gunpoint. When G. O Ring ascertained what had taken place, he immediately called Ike Mann, a local police officer and described the situation to him. Ike Mann interrogated Fanny and demanded that she either return the car or pay the $100.00 charges. When she refused to do either, he jailed her and G. A. Lahad.

G. A. Lahad turned eighteen the week after the problems occurred although he looked much older. Ike Mann charged them both with "Break, Enter and Theft".

G. O. Ring had a silent partner named Franz Uhrer who was confined to a hospital for the criminally insane. The partnership was never registered and F. Uhrer had not been active in the business for many years.

In connection with the foregoing set of facts, students should be prepared to answer questions on tests.

The following questions are based on "The Trespassers" and were generated by the computer; they are included here to illustrate the type of testing that may be done. Some questions are shown with source reference and answers, and are repeated without answers or source reference. The statements that make up the questions were drawn from two separate files, one composed of statements on procedural law, and the other from a file on substantive law and theory. They could be created from either file rather than from both, depending on the objectives of the test.

Two difficulty levels are employed; 3 and 4, but it should be noted that the difficulties are compounded by the fact that a knowledge of a number of areas of substantive law and procedures are required in order to answer the questions. By using case-studies the taxonomy level of tests may be substantially increased, as the teacher sees fit.

Question One (level three)

WHICH OF THE FOLLOWING IS MOST CORRECT?

With answers

(a) If Fanny Shawe won her case against the G.E. Stoppo Towing Company she would be entitled to general damages. [T]

(b) Under no circumstances did Fanny Shawe have the legal right to enter the G.E. Stoppo property in order to recover possession of her car [F]

(c) The G.E. Stoppo Company had the legal right to retain possession of the car until the towing and storage charges were paid. [F]

Without answers

(a) If Fanny Shawe won her case against the G.E. Stoppo Towing Company she would be entitled to general damages.

(b) Under no circumstances did fanny Shawe have the legal right to enter the G.E. Stoppo property in order to recover possession of her car.

(c) The G.E. Stoppo Company had the legal right to retain possession of the car until the towing and storage charges were paid.

Question Two (level four)

WHICH OF THE FOLLOWING IS LEAST CORRECT?

With answers and source data

[b2c02u15.5] (a) In the civil cases arising from the case-study, the Plaintiff prepares a statement of claim, and the defendant prepares a statement of defence. [T]

[b2c02u15.32] (b) When Ike Mann took Fanny Shawe into custody he had the legal obligation to advise her that she is under arrest. [T]

[b2c02u14.1] (c) Because of his age, G.A. Lahad could not be held liable either on the criminal charge of "break, enter and theft" nor could he be held liable in tort. [F]

[b2c02u14.2] (d) G.O. Ring did not have the legal right to make an arrest in these circumstances. [T]

Without answers or source data

(a) In the civil cases arising from the case-study, the Plaintiff prepares a statement of claim, and the defendant prepares a statement of defence.

(b) When Ike Mann took Fanny Shawe into custody he had the legal obligation to advise her that she is under arrest.

(c) Because of his age, G.A. Lahad could not be held liable either on the criminal charge of "break, enter and theft" nor could he be held liable in tort.

(d) G.O. Ring did not have the legal right to make an arrest in these circumstances.

Case-studies are used in many other disciplines as part of the teaching methodology. I can see no reason why they could not be adapted for testing as above in addition to their current uses.

Basing Questions On Charts And Diagrams

The two questions which follow on this page are based on the charts of the courts, which follow them. The purpose is to illustrate that diagrams, charts, schematics or flow charts may be utilized in the same way as case-studies, both for teaching purposes and for testing.

Question (1) Civil Courts

WHICH OF THE FOLLOWING IS MOST CORRECT ?

F (a) An appeal from an administrative tribunal would normally be taken to the Ontario Court of Appeal.

T (b) An appeal from the Small Claims Court would normally be taken to the Divisional Court.

F (c) An appeal from the Ontario Court of Appeal would be taken to the Federal Court of Canada, (Appeal Division).

Question (2) Criminal Courts

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

T (a) The Supreme Court of Ontario has exclusive jurisdiction in Murder, Treason, and Piracy cases.

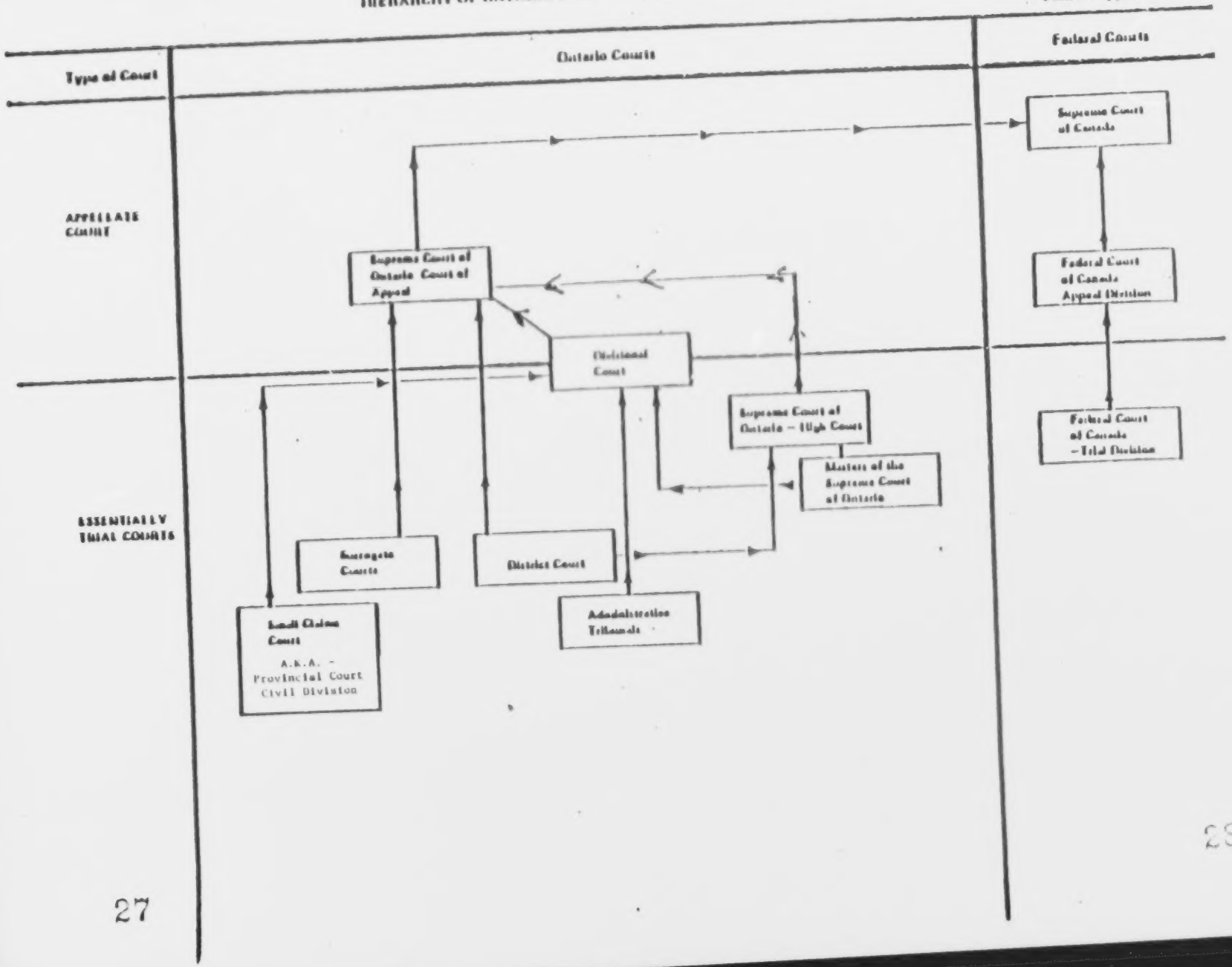
T (b) Offences created by provincial legislation are triable in the Provincial Offences Court.

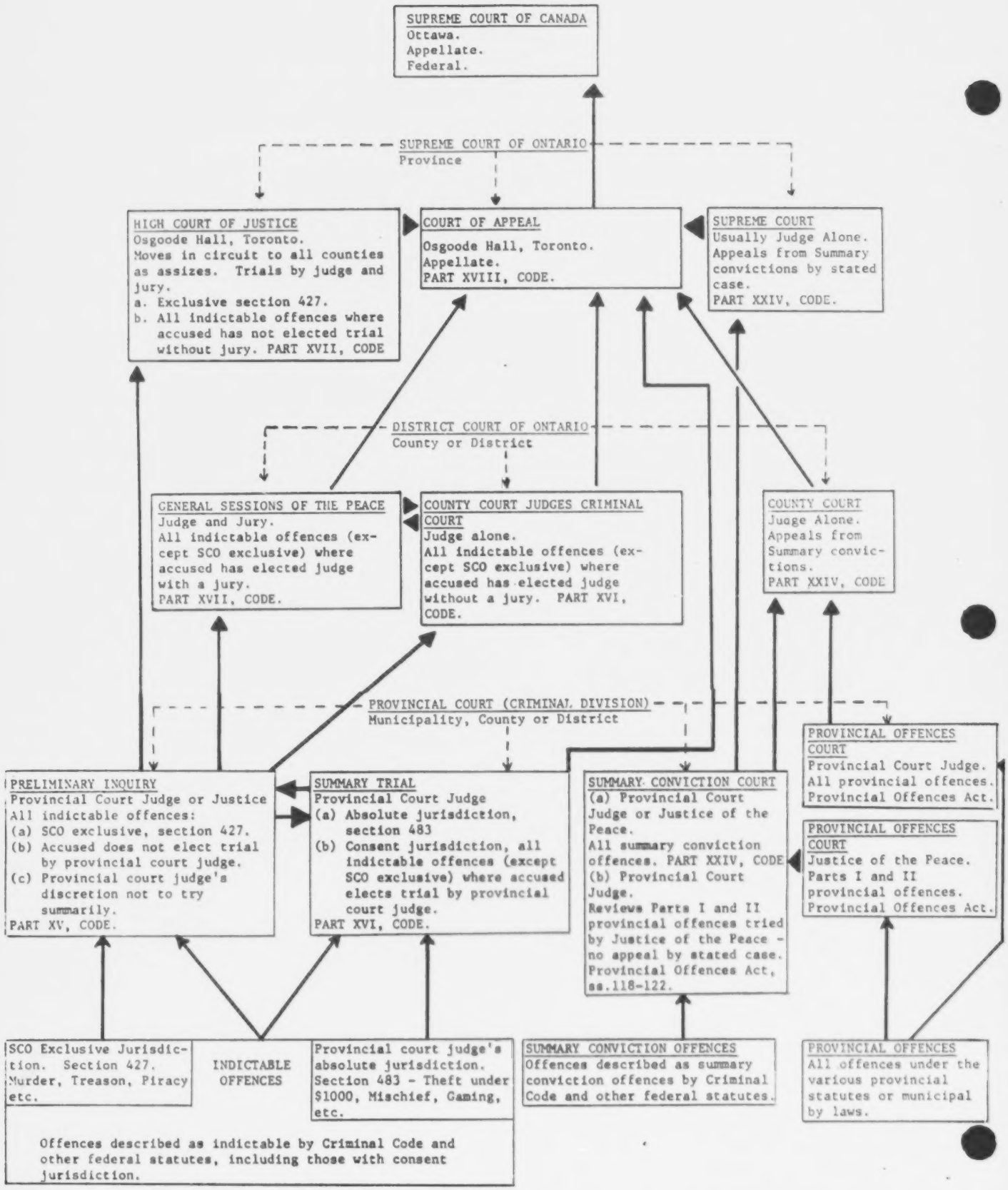
F (c) An appeal from a Summary Conviction Court may be taken to the County Judges' Criminal Court.

T (d) A Preliminary Inquiry is normally conducted by a Provincial Court Judge.

HIERARCHY OF ONTARIO CO... ...VING CIVIL JURISDICTION

Legend: →
Path of Appeal




SUPREME COURT OF CANADA
Ottawa.
Appellate.
Federal.
SUPREME COURT OF ONTARIO
Province
HIGH COURT OF JUSTICE
Osgoode Hall, Toronto.
Moves in circuit to all counties as assizes. Trials by judge and jury.
a. Exclusive section 427.
b. All indictable offences where accused has not elected trial without jury. PART XVII, CODE
COURT OF APPEAL
Osgoode Hall, Toronto.
Appellate.
PART XVIII, CODE.
SUPREME COURT
Usually Judge Alone.
Appeals from Summary convictions by stated case.
PART XXIV, CODE.
DISTRICT COURT OF ONTARIO
County or District
GENERAL SESSIONS OF THE PEACE
Judge and Jury.
All indictable offences (except SCO exclusive) where accused has elected judge with a jury.
PART XVII, CODE.
COUNTY COURT JUDGES CRIMINAL COURT
Judge alone.
All indictable offences (except SCO exclusive) where accused has elected judge without a jury. PART XVI, CODE.
COUNTY COURT
Juage Alone.
Appeals from Summary convictions.
PART XXIV, CODE
PROVINCIAL COURT (CRIMINAL DIVISION)
Municipality, County or District
PRELIMINARY INQUIRY
Provincial Court Judge or Justice
All indictable offences:
(a) SCO exclusive, section 427.
(b) Accused does not elect trial by provincial court judge.
(c) Provincial court judge's discretion not to try summarily.
PART XV, CODE.
SUMMARY TRIAL
Provincial Court Judge
(a) Absolute jurisdiction, section 483
(b) Consent jurisdiction, all indictable offences (except SCO exclusive) where accused elects trial by provincial court judge.
PART XVI, CODE.
SUMMARY CONVICTION COURT
(a) Provincial Court Judge or Justice of the Peace.
All summary conviction offences. PART XXIV, CODE
(b) Provincial Court Judge.
Reviews Parts I and II provincial offences tried by Justice of the Peace - no appeal by stated case.
Provincial Offences Act, ss.118-122.
PROVINCIAL OFFENCES COURT
Provincial Court Judge.
All provincial offences.
Provincial Offences Act.
PROVINCIAL OFFENCES COURT
Justice of the Peace.
Parts I and II provincial offences.
Provincial Offences Act.
SCO Exclusive Jurisdiction. Section 427. Murder, Treason, Piracy etc.
INDICTABLE OFFENCES
Provincial court judge's absolute jurisdiction. Section 483 - Theft under $1000, Mischief, Gaming, etc.
SUMMARY CONVICTION OFFENCES
Offences described as summary conviction offences by Criminal Code and other federal statutes.
PROVINCIAL OFFENCES
All offences under the various provincial statutes or municipal by laws.
Offences described as indictable by Criminal Code and other federal statutes, including those with consent jurisdiction.

All provincial court judges are justices of the peace, but not all justices are provincial court judges. The provincial court judge can try cases of indictable offences. The justice of the peace can hold a preliminary inquiry for indictable offences, try summary offences, try certain provincial offences, and perform such functions as issuing summonses and warrants of arrest as well as the granting of bail.

Creating Individualized Study-Guides and Self Directed Learning

Although this manual is mainly devoted to the creation of tests, we should not allow ourselves to lose sight of the fact that good testing means good teaching. The ability to create well designed test resources with much less tedious effort makes it possible to create comprehensive study guides to match the specific objectives of your courses, and to vary or alter them as you see fit. You may use case-studies, charts or diagrams, flow charts, and schematics, or similar devices of your own creation, and base questions on them which become progressively more complex, as described in the case-study example of "The Trespassers." Again, the selective use of permutations and combinations of the statements that you write allow you to set the pace for covering the text material, and even individualize it, as you wish. The logistics of individualizing study guides are, otherwise, prohibitive without the facility created by the computer program described in this manual.

To put it succinctly, the program enhances self-directed learning enormously.

All of the foregoing is subject to the cardinal principle of computer applications.

GIGO - garbage in, garbage out.

The computer assembles questions and tests, it does not write intelligent statements, nor will it classify and index them to meet your objectives. We still need teachers for those essential purposes.

THE CLASSIFICATION SCHEME

The classifications for the test files correspond with the classification of the manuscript and other resource material that I use for teaching law. I have developed manuscript in 5 separate books, each of which is divided into chapters and subclassified into units. In order to implement the Computer Test Program the teaching resource material and test files are classified as part of the data base. In other disciplines it is, also, necessary to create a classification scheme.

The 5 "books" for law are organized as follows:

Book 1 The Canadian Legal System. This includes chapters on: 1.Jurisprudence. 2. The Origins and Sources of Law. 3. Constitutional Law and Sources. 4. Theories of Property Ownership. 5. The Procedures For Obtaining Your Rights and Enforcing Them. Chapter 5 also includes The Organization of the Courts and Administrative Tribunals along with a description of the remedies or awards which they may provide. Chapter six in book 1 deals with Human Rights under Ontario law including The Human Rights Code. The Canadian Charter of Rights and Freedoms is covered in chapter 3 but chapter 6 adds provincial law which creates civil rights. The two chapters together fully describe the laws of fundamental rights under the Canadian System.

BOOK ONE -- THE CANADIAN LEGAL SYSTEM

Chapter One - Understanding the Law
Chapter Two - The Evolution of Law
Chapter Three - Constitutional Law & Canada's Charter of Rights and Freedoms
Chapter Four - Property and Ownership Theories
Chapter Five - The Organization of Courts - Procedures and Enforcement of Judgment
Chapter Six - Civil Rights In Ontario
Chapter Seven - Legal Responsibility and Status and Legal Remedies

BOOK TWO -- SUBSTANTIVE LAW

Chapter One - Criminal Law
Chapter Two - The Law of Tort
Chapter Three - Contracts
Chapter Four - Consumer Protection
Chapter Five - Medico Legal Law - Consent of the Patient
Chapter Six - Journalism Law
Chapter Seven - Construction Industry Law
Chapter Eight - Social Organizations and Non-Profit Corporations

Chapters 5, 6, and 7, were created for specific courses taught to students in programs where they need to know the rules of their own trade or profession.

BOOK THREE -- COMMERCIAL LAW

Chapter One - Landlord and Tenant Including Residential Tenancy Law
Chapter Two - Real Estate - Purchase and Sale - Title Searches
Chapter Three - Personal Property Law
Chapter Four - Creditors' Rights and Bankruptcy
Chapter Five - Forms of Business Proprietorship
Chapter Six - Banking and Bills of Exchange
Chapter Seven - Labour Relations
Chapter Eight - Insurance

BOOK FOUR -- FAMILY LAW

Chapter One - Marriage and Common Law Spousal Contracts
Chapter Two - Separation - Divorce - Annulment
Chapter Three - The Family Law Act and Property Rights
Chapter Four - Children's Law
Chapter Five - Enforcement of Judgments and Orders In Matrimonial Cases
Chapter Six - Wills - Intestacy - Succession Laws
Chapter Seven - Pensions - Insurance - Annuities and Estate Planning

BOOK FIVE--
CITIZENSHIP, TAXATION, INTERNATIONAL LAW AND IMMIGRATION RULES

Chapter One - Citizenship
Chapter Two - Taxation
Chapter Three - International Law
Chapter Four - Immigration Rules

TEST ANALYSIS - QUESTIONS ANALYSIS

Attached to this manual as addenda three are excerpts from a computer printout of a test written by one of my classes. The program used at Fanshawe College in London is probably typical of those used in many other education institutions. They should be recognized as having extensive diagnostic value for teachers, and the following is a description of how the computer printout may be used:

Addenda Three A

1. STUDENT GRADES--This is the obvious use, and the printout will provide this data in descending order, ascending order, alphabetical order, or in numerical order if the student numbers are used to identify the candidates, as opposed to the use of their names. In the example, they are shown in descending order, and the "Bell-Curved" mark has been added subsequently

   INDIVIDUAL STUDENT INFORMATION--The printout also shows a "line score" for each student indicating what answer he or she gave on every question. If the right answer was given the printout shows a dot. If the wrong answer was given the printout shows the letter which the student gave as the answer. If no answer was given there will be a dash, and if a multi-answer or invalid answer was given there will be a question mark. An example "line-score" is shown at the bottom of Addenda Three A.

Addenda Three B

2. STATISTICAL DATA--This includes a statement of the high mark, the low mark, the median mark, and the average or mean mark. In addition, the printout shows the distribution of the marks from 0 - 100 by specifying how many score in the 90's, 80's, 70's, etc., prior to bellcurving.

Addenda Three C

3. QUESTIONS INFORMATION--The printout shows the question number, the answer as inputted into the computer, the number of students who chose answer A, B, C, D, or E, or more if more choices were given; it also shows how many students gave no answer or an invalid answer for each of the questions. An invalid answer may be a double answer where the student did not cleanly erase a choice and made a second choice, as a result of which the computer picks up both.

   It is possible to show two choices as an answer to a question, in which case a student who only gives one choice would be marked wrong. All of this data is also shown in percentages.

MODES--This data is an indication of how many times "A" was chosen as an answer or "B", or "C", or "D" or "E" as the case may be. In a five choice question the ideal would be to have each letter as the correct answer as a reasonably equal number of times with the others.

The value of this data to the teacher is in the opportunity to immediately access the distribution of the choices of the students. If a high percentage of the students choose the same wrong answer the teacher may suspect that some ambiguity exists or, that the alternate answer chosen is so close to the correct answer as to be unfair, or ambiguous.

Addenda Three D

4. QUESTIONS DIFFICULTY LEVEL--The computer gauges the difficulty level of each of the questions on the basis of the success or failure of the class in answering it. For each question a range is shown from 100 for the top or easiest questions, descending to a minus quantity for the ones that the students found to be very difficult. This is an indication that the students found the question to be difficult, and that it may not have been very well covered in the lessons. On the other hand, it may be an indication that the question is particularly difficult or unfair in which case the teacher has the option of disqualifying it if he/she sees fit to do so.

DISCRIMINATION INDICES--The computer printout rates the ability of each question to distinguish between the top students, and students in the bottom half of the class, in the sense that one would expect the top half of the class to do better on each question. The range shown in this index is from -1 to +1 and if the top half of the class has done better than the bottom half, the figure shown will be a plus quantity; whereas if the bottom half of the class did better on a specific question than the top half, the numerical quantity shown would be a minus quantity. This also serves as an alert or warning for the teacher to check the question and see whether there are any ambiguities which are misleading the students.

In addition to an analysis of how effective each individual question is in distinguishing between top and bottom half, the printout also shows the discriminatory ability of each part of each question; i.e. each of the statements that make up the question, which are called the distractors. This is done by showing what percentage of the top of the class gave as answers and what percentage of the bottom half gave the answers. Obviously, one would expect that the bottom half of the class would choose the wrong answer more often than would the top half of the class.

All of the foregoing data will be made available within an hour if some urgency is shown, but the normal turn around time is overnight.

The opportunity for immediate feed back is self evident. If the students are right, with respect to any part of the test, their knowledge is reinforced immediately, and presumably and will be retained better. If the student is wrong he/she is also made immediately aware of it, and is given the correct answer. Hopefully, the student will learn from the mistake. I tell my students to keep their copies of tests as a valuable addition to their notes. ie. learning from the results. With my test generator and its potential for the production of near infinite numbers of questions, I do not need to repeat tests or questions, and am not concerned about copies of tests being circulated?

With the data provided above, I can identify questions which need to be explained and perhaps retaught. I even go so far as to specifically tell the students that a question which was poorly answered by the class will reappear in a modified form on the very next test. In this case the students get the opportunity to benefit from their mistakes in the sense that they may learn from them. The purpose of retesting is to ascertain whether or not they have done so.

I have been asked both by teachers and by students,

"What if a student or students disagree with an answer to a question or challenge whether it is unfair or ambiguous?"

If the analysis of the test shows that a question is unfair or ambiguous I will disqualify it and have the marks recalculated on the basis of the questions which are not disqualified. To do this manually would be a considerable chore but when done by computer it is only a minor nuisance. The students appreciate the objectivity and eminent fairness of this procedure.

If the computer analysis shows that the question was difficult, but not ambiguous, we have a wonderful opportunity for debate and discussion. On occasion, I deliberately input a wrong answer to create this opportunity for controversy.

BELLCURVE--(see Addenda Three A for an application) I deliberately set difficult tests and warn students in advance of my intention to do so. However, I also explain to them that their grades will not be prejudiced by difficult tests because the computer will apply a bellcurve to the results so that the average and median marks correspond with college policy as to grading. At Fanshawe College, a mark of 90+ is A+ 80+ is A, 70+ is B, 60+ is C, 50+ is D, and under 50 is unsatisfactory. With this criteria the average and median mark should be in the range of 65-70. If the average and median marks shown on a test result, vary substantially from the desired median I will apply a bellcurve. Once again, the calculations are done by computer and the inconvenience or effort by the teacher is minor. My rationale for

implementing a bellcurve and explaining it to the students is the fact that I prefer to avoid damaging the morale of the class by consistently low marks. On the other hand, I consider it very important to ascertain the extent to which a class has absorbed the lessons, and easy tests would not disclose this important information. I also advise my students that there is nothing wrong with making mistakes if it is done in the classroom rather than in the so-called real world. A mistake made in the classroom is an opportunity to learn whereas a mistake made in the real world may be very expensive.

ADDENDA THREE A

O P T I C A L M A R K T E S T S C O R I N G

F I N A L S T A T I S T I C S

I N S T R U C T O R: J. V E L A N O F F

STUDENT NO.	STUDENT NAME	CORRECT	PERCENT	WRONG	NO ANSWER	MULTI-ANSWER	FINAL MARK WITH BELL-CURVE
Student names have		24	75.0	8			93.9
been omitted to		22	68.7	10			86.1
preserve their		22	68.7	10			86.1
right of privacy.		21	65.6	11			82.2
		19	59.3	13			74.3
		17	53.1	15			66.5
		17	53.1	15			66.5
		16	50.0	16			62.7
		16	50.0	16			62.7
		16	50.0	16			62.7
		16	50.0	16			62.7
		15	46.8	17			58.7
		15	46.8	17			58.7
		14	43.7	18			54.8
		14	43.7	18			54.8
		13	40.6	19	1		50.9
Student Name		22	68.7	10			

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
		.	C	.	.	.	.	.	B	.	B	.	.	.	A	D	E	.	C	.	.	A	.	.	.	.	.	.	A	.	B	.

A+ = 90+ A = 80 - 89 B = 70 - 79 C = 60 - 69 D = 50 - 59

UNSATISFACTORY = LESS THAN FIFTY

ADENDA THREE B

O P T I C A L M A R K T E S T S C O R I N G

F I N A L S T A T I S T I C S

INSTRUCTOR NUMBER OF ITEMS 32 5 CHOICES DATE 86-07-21

ITEM	ACTUAL	PERCENT
NUMBER OF STUDENTS	18	
MEAN SCORE	16	53.46
MEDIAN SCORE	16	50.00
LOW SCORE	13	41.00
HIGH SCORE	24	75.00
STANDARD DEVIATION	CORRECT	5.180
VARIANCE	CORRECT	26.848
CO-EFFICIENT OF RELIABILITY		.702
STANDARD DEVIATION	PERCENT	16.200
VARIANCE	PERCENT	262. 370

GRADES

90 - 100		
80 - 89		
70 - 79	1	5.00
60 - 69	4	22.00
50 - 59	6	33.00
40 - 49	6	33.00
30 - 39		
20 - 29		
10 - 19		
- 9	1	5.00

END OF FINAL STATISTICS

ADDENDA THREE C

O P T I C A L M A R K T E S T S C O R I N G

Q U E S T I O N A N A L Y S I S

QUES. AND ANSW.	CHOICES A/1	B/2	C/3	D/4	E/5	NO ANSWER	MULTI ANSWER	PERCENT A	B	C	D	E
1-C	3	1	5	2	6			16	5	27	11	33
2-C	4		13					22		72		
3-D	1	1	6	6	3			5	5	33	33	16
4-A	8	5		1	3			44	27		5	16
5-B		11			6				61			33
6-C	2	4	11					11	22	61		
7-D			1	16						5	88	
8-A	7	9	1					11	50	5		
9-A	2	11	4					11	61	22		
10-B	3	13	1					16	72	5		
11-D		1	9	6	1				5	50	33	5
12-B		12			5				66			27
13-D	1	1	6	9				5	5	33	50	
14-D	2	1		13				11	5		72	
15-B	6	10	1					33	55	5		
16-A	10	6		1				55	33		5	
17-C		2	9	2	4				11	50	11	22
18-A	13	1	3					72	5	16		
19-A		3	14						16	77		
20-B	1	11	5					5	61	27		
21-A	7	9	1					38	50	5		
22-B	10	3	4					55	16	22		
23-C	7	2	8					38	11	44		
24-D	1	1	9	6				5	5	50	33	
25-D		3	1	13					16	5	72	
26-D	6	2		9				33	11		50	
27-B	3	9	2	2				16	50	11	11	
28-A	13	2	1	1				72	11	5	5	
29-D	2	4		9	2			11	22		50	11
30-C	1	6	10					5	33	55		
31-A	7	9	1					38	50	5		
32-E	2	3		1	11			11	16		5	61
	122	156	126	97	41			ANSWER MODES				
	9	7	6	9	1			QUESTION MODES				

ADENDA THREE D

O P T I C A L M A R K T E S T S C O R I N G

Q U E S T I O N E V A L U A T I O N

QUES. AND ANSW.	DIFFI-CULTY INDEX	DISCRI-MINATION INDEX	DISTRACTOR EFFECTIVENESS A UPPER/ LOWER	B UPPER/ LOWER	C UPPER/ LOWER	D UPPER/ LOWER	E UPPER/ LOWER
1-C	9.65	0.00	16.6(U)		33.3(U)	16.6(U)	33.3(U)
					33.3(L)		50.0(L)
2-C	65.27	0.66			100.0(U)		
			50.0(L)		33.3(L)		
5-B	51.40	0.00		50.0(U)			50.0(U)
				50.0(L)			33.3(L)
7-D	86.02	0.16				100.0(U)	
						83.3(L)	
9-A	-11.10	0.16	16.6(U)	66.6(U)	16.6(U)		
				66.6(L)	16.6(L)		
11-D	16.65	-0.16		16.6(U)	66.6(U)	16.6(U)	16.6(U)
					33.3(L)	33.3(L)	

19 ** NOT USED IN THIS TEST ** (No student got this one right the computer showed it as "Not used in this test," for that reason. This alerts the teacher to the need to check the question)

25-D	65.27	-0.16		33.3(L)	16.6(L)	100.0(U)	
						33.3(L)	

If you examine "Addenda Three C, you will see how many of the students chose answer A, B, C, D or E for each of the questions evaluated above. Only eight were selected to show here, for reasons of space, but they typify the explanations described in the text.

Grades - Automation and Teacher Evaluation

Clearly, it is necessary to provide grades at the conclusion of a semester or school term; however a distinction should be made between the grades at the end of a school term and the marks on each and every individual test. It is my view that testing is an integeral part of the teaching and its primary value is in learning what one does not know, in order that he or she may be taught. With the use of computers, it is possible to test far more frequently than otherwise, which should therefore improve the learning process.

I am very much concerned that computerised testing may be used by some teachers and some administrators for purposes other than the improvement of the learning and teaching processes. Clearly, great economies may be effected by relieving the teachers of the drudgery of setting and marking tests; provided that this is not done to the exclusion of other methodologies. The danger also exists that administrators will choose to reduce the number of teachers because of the apparent reduction in work load, rather than improve the quality of education with the benefits of automation. There is also a danger that some teachers may be tempted to use computerized testing solely for the purposes of reducing their work load, without the compensating factor of improving the quality of education.

TEACHER EVALUATION

The solution to the problems stated above appears to lie with increased efforts towards higher professional standards among teachers. One of the most persistent problems in the teaching profession has been the difficulty of judging the performance of teachers in the classroom and the effectiveness of their teaching. This is not to suggest that the profession has been unable to identify the best teachers and the poorest teachers, but most certainly there has been a severe lack of objectivity in the evaluation of teacher performance generally.

Computerized testing should prove to be a partial solution to this problem. If a substantial part of student evaluation is done by computer in the objective ways described above, then it becomes apparent that a comparison of the accomplishment attained by students taught by Teacher A or B or C, etc. will, in the long run, indicate which teacher or teachers are most effective. Hopefully, this information would be used constructively in the sense that if a teacher's classes are not performing as well for him or her, it would be easy to identify that fact objectively, and then provide advice and assistance from more experienced colleagues in the educational institution.

Most teachers can recount horror stories of teacher evaluation by classroom visit, student complaints and petitions, and surveys of

students. Some of these have a degree of validity but they lack objectivity. Classroom visits are usually on a periodical basis according to prearranged inspections, and the classes tend to be contrived and atypical. Evaluation by students is highly controversial, legally dangerous because of the potential for libel, and is therefore of questionable value.

Computerized testing as described above can provide objective data as to the effectiveness of the instruction as opposed to the quality of the classroom performance, and it can be used to indicate when in-depth teacher evaluation should take place.

In conclusion, it is respectfully submitted that the foregoing is worthy of field testing and in-depth study. I especially urge the teaching profession to exercise its own initiative in this regard because I am convinced that computerized testing and evaluation is inevitable having regard to the economies demanded by the taxpayers. If the profession fails to implement automation and the economies that result, it will be imposed by bureaucracy.

It is your choice to make, while you still have some say in the matter.

Addenda of Questions In Other Disciplines
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ADDENDA OF QUESTIONS IN OTHER DISCIPLINES

The example questions which follow are all at level three, but they could be generated using all the levels illustrated in this manuscript.

INTRODUCTORY PHILOSOPHY

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) The goal of an existential philosophy of time would be to intensify and enrich our experience of the living present.
B) The principal function of all symbolic language is to communicate ideas; the use of language to express emotion is a misuse of this symbolic function.
C) The four basic sources of knowledge are reason, authority, realism, and coherence.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) Human beings can, by agreement, make any symbol stand for sanything.
B) All our senses are transducers, illustrating Freud's statement that all human energy is essentially sexual in nature.
C) The two general forms of reasoning are deduction and induction.

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) The more general our mental abstractions, the further our thinking moves from particular objects; we should therefore discipline our minds to think only about single objects, thereby eliminating abstractions altogether.
B) Hume contended that the concept of casuality is merely an idea produced by the mind to organize and make sense of its experience.
C) The Buddha had no objection to a full and sensuous enjoyment of life providing it was lived and dedicated to the glory of God.

SMALL BUSINESS STUDIES

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) Resources owned by a business are called liabilities.
B) Resources owned by a business are called assets.
C) The interest rate on demand loans is usually 4% above the bank's prime.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) The balance sheet reports a summary of operations for a specific period of time.
B) The interest rate on demand loans is usually 1 1/2% above the bank's prime.
C) The income statement reports a summary of operations for a specific period of time.

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) A small business needs capital to start or money to operate the business, but not both.
B) Not only does a small business need capital to start, but also needs money to operate the business.
C) Accumulated depreciation of an asset can be found on the income statement.

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) An income statement contains the income a business has earned and all expenses the business incurred in earning the income.
B) An income statement contains the income a business has earned, but not the expenses incurred in earning the income.
C) A banker wants to lend money to small businesses with risks involved.

ECONOMICS

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) In order to ensure full liability to the public, lawyers are legally obligated to organize as a partnership.
B) In order to ensure full liability to the public, lawyers are legally obligated to organize as a cortel.
C) Sole proprietorship refers to a business owned by one person.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) Bondholders have no voice in the management of the corporation.
B) One incentive to organize business firms is that the increasing returns to scales for production is greater than the yearly output of an individual producer.
C) Usually owners of common stock have one vote.

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) An advantage of sole or single proprietorship business organizations is limited liability.
B) Methods of depreciation provided to business are not effective in todays economic conditions because depreciation is based on historical cost and assumes no inflation.
C) A public corporation is limited to 50 shareholders.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) One major difference between a co-operative and an ordinary business corporation is that ownership is determined by shares.
B) The point of diminishing marginal productivity is the point where marginal product reaches a maximum.
C) If a farmer increases the amount of fertilizer he uses, that would be a short run adjustment.

MARKETING

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) The development of marketing middlemen becomes less desirable as the number of producers and consumers, their distance apart, and the number and variety of competing products increase.
B) The "universal functions of marketing" are performed differently and by different parties in different economic systems.
C) During the marketing department era, increased competition makes firms emphasize advertising and selling to attract customers.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) As opposed to "mass marketing", "target marketing focuses on a specific group of customers.
B) The "universal functions of marketing" do NOT include standardization of grading.
C) Carrying out the "marketing concept" might require a change in the firm's management methods and procedures.

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) The main difference between the "marketing department era" and the "marketing company era" is more emphasis on advertising and selling in the marketing department era.
B) The "Product" variable can be concerned with physical goods.
C) Financing and risk taking involves sorting products according to size and quality.

COMPUTER STUDIES

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) The routine that manages the processor's time is called the scheduler.
B) Under DOS/VSE, a separate job stream is maintained for each partition.
C) Interrupts are sensed by software and processed by hardware.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) Most time-sharing systems are interrupt driven.
B) A network consists of two or more computers linked by communication lines.
C) On a star network, all the host computers are linked to a common, central machine.

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) The operating system is a hardware/software interface.
B) On some computers, the basic addressable unit of memory is a group of bytes called a bit.
C) On disk, data are recorded on concentric circles called cylinders.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) Application routines request logical records; hardware transfers physical records.
B) Application routines request structured records; hardware transfers unstructured records.
C) Because a channel and the computer are independent, the main processor has no way of knowing when an I/O operation is completed unless the channel tells it.

DEVELOPING A BUSINESS PLAN

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) Once a business plan has been developed it should never be changed.
B) By planning cash needs ahead of time a small business is able to develop a sound borrowing program and repayment schedule.
C) Because planning takes a person away from productive work, it is a waste of time.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) A business plan is used only for predicting the amount of tax the business will have to pay.
B) Making a profit in small business requires careful planning.
C) A good business plan should take many hours to develop.

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) Once a bank loan has been obtained a business no longer needs a business plan.
B) The efficient use of cash is the key to a successful business.
C) A good business plan should contain very optimistic projections.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) Sales constitute the major source of cash receipts.
B) The purpose of a business plan is to develop a planning tool for business.
C) It is impossible to estimate sales for a new business.

LEGAL FORMS

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) An advantage of partnership is the additional source of capital provided by the partners.
B) A sole proprietorship is considered to be an artificial legal entity.
C) Incorporating a business does not cost any money.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) Partnership profits are taxed in the hands of the individual partners.
B) A sole proprietorship is a business owned and operated by one person.
C) The advantage of the corporation is the low starting costs of forming a corporation.

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) The most popular form of business organization if the partnership.
B) A corporation is the most costly form of business organization.
C) Incorporating a business is relatively simple.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) A corporation cannot be sued in court.
B) A disadvantage of sole proprietorship is that the life of the business is limited to the life of the business.
C) A corporation has the greater ability to raise capital.

BUSINESS FINANCE

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) A small business needs capital to start or money to operate the business, but not both.
B) Not only does a small business need capital to start, but also needs money to operate the business.
C) A business does not require, in finances, both start-up capital and operating capital.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) A banker wants to lend money to small businesses with risks involved.
B) A business requires, in finances, both start-up capital and operating capital.
C) The only time an entrepreneur has any clout with the banker is when he first approaches the bank.

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) A demand loan is a loan that is payable to the bank when the bank demands full payment.
B) With a well thought out business plan, the entrepreneur will still have trouble borrowing money.
C) A demand loan is a type of loan that an entrepreneur can demand from the bank.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) Bankers are not interested in being in a partnership with small businesses.
B) Over 90% of all Canadian businesses sell a product or service that is seasonal.
C) The interest rate on a demand loan does not fluctuate as the bank's prime rate fluctuates.

FINANCIAL STATEMENTS

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) Net income does not increase owner's equity.
B) Accounts payable is an asset.
C) An income statement contains the income a business has earned and all expenses the business incurred in earning the income.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) The balance sheet reflects the position of the company as of a particular date.
B) Accounts receivable is an asset.
C) A creditor does not represent a liability.

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) Accounts payable is not found on the balance sheet.
B) Cash is found on the balance sheet.
C) Accumulated depreciation of an asset can be found on the income statement.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) Mortgage payable is an asset and appears on the income statement.
B) The income statement reports a summary of operations for a specific period of time.
C) Depreciation expense indicates how much of an asset has been used up in a year.

SOCIOLOGY

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) The group of social scientists who argue that the underdeveloped nations are in fact underdeveloping as a result of unfavourable trade relations with capitalist interest use the dependency theory.
B) The kind of prestige that is most important in society is based on one's education.
C) In Marxian analysis, the bourgeoisie are workers, and the proletariat are owners.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) Women are exposed to greater health risks than men because they are more apt to have mood-modifying drugs prescribed.
B) The best way of describing the relation between social class and childrearing is the higher the class level the more permissive the parenting.
C) The situation in which a person ranks higher on one dimension of stratification than another is termed status dichotomy.

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) According to Statistics Canada, affluent people are more likely to consult a doctor than are poor people.
B) The relationship of hormones and social behavior is one of mutual interaction.
C) In applying a reputational approach to the study of social inequality, a researcher would proceed by setting certain boundaries and sorting the population accordingly.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) The relationship of hormones and social behavior is one of total independence.
B) In the article "Canadian Perspectives in Health Promotion", Labonte & Penfold argue that health promotion programs must take into account the social context within which people live.
C) Functionalists argue that patriarchy persists because it is the most effective way to raise and support a family.

COMPARATIVE DEVELOPMENT

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) Shared similarities seems to distinguish loving from liking more so than exclusiveness, or dependency, or positive evaluation.
B) Sex-role stereotypes are ways of simplifying complex stimuli from the world around us.
C) Erikson believes that a person's view of his or her life as well spent leads to a sense of generativity.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) According to Erikson, the development of intimacy is a crucial issue during late adulthood.
B) The study of moral development is concerned with moral reasoning.
C) Regarding premarital sex, it has been found that more men than women believe that it is not morally wrong.

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) At Kohlberg's postconventional level of moral development, morality is internalized completely.
B) There is some evidence that, even in infancy, parents play more actively with girls than with boys.
C) The most popular form of education before the first grade usually is referred to as socialization.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) Males show a gradual decline of their sexual activity level with age.
B) Death is sometimes seen as an act of atonement for one's sins.
C) Mid-life sexual activity declines sharply.

PERSONNEL MANAGEMENT

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) In using pay to motivate performance, it is not necessary that employees must be motivated by money.
B) Protection against disability is provided by group disability plans.
C) The job safety analysis training guide is a manual for developing safety training programs.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) In order to reduce benefit costs, an organization may require increased contributions to pension plans from women, who tend to live longer beyond retirement.
B) Under the Ontario Health and Safety Act, joint health and safety committees are to identify hazardous situations and make recommendations to the employer.
C) A 1981 federal-provincial commission enquiring into safety in the mines found that several local unions were concentrating on identifying workplace hazards instead of trying to eliminate hazardous work practices.

WHICH OF THE FOLLOWING IS MOST CORRECT ?

A) The Scanlon Plan is an individual incentive pay system.
B) Group insurance programs include noncontributory plans.
C) The job safety analysis training guide is a ready-made program for teaching safe work behaviour.

WHICH OF THE FOLLOWING IS LEAST CORRECT ?

A) A labour-intensive organization in a dominant position in the labour market can best afford a larger compensation budget.
B) A 1981 federal-provincial commission enquiring into safety in the mines found that health and safety committees were not functioning as they should.
C) The safety record of the Alberta oil rigs could be improved by better maintenance of equipment.

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THE KEEWATIN INCIDENT

The following is an elaborate case-study that creates a large number and variety of ethical-moral-legal questions, and which is intended to be used over an entire semester. I believe it could be dramatized and utilized for educational television programming.

In the summer of 1987 the American and Soviet governments reconciled some of their differences and agreed to launch a joint space venture to explore the planet Mars. By mutual agreement both nations had constructed a space ship with the intention that they would be launched together and travel as a team. Toward this end, it was agreed that some of the crew on the American ship would be Russians and some of the crew on the Russian ship would be Americans. The overall command was given to a triumvirate composed of one appointee from each of the two nations and a chairperson to be selected by the two appointees.

In addition to the actual crews that operated the spaceships, there were a number of scientific personnel selected from among the top scientists in each nation.

Although the launch itself was successful, the spaceships ran into difficulties almost immediately, and after one week all communications between the spaceships and the planet Earth were lost. Space Command on Earth had no explanations for the unexpected loss of communications and after many unsuccessful efforts had been made to ascertain where the spaceships were, it was presumed that they had somehow been destroyed. Hope for the crews and scientific personnel was finally abandoned after a number of months during which exhaustive efforts for rescue had been made.

What was unknown to Earth Space-Command was the fact that the spaceships had encountered a type of meteor storm which had not been anticipated, and which caused severe damage in addition to totally interrupting the communications systems. Nevertheless,the crews were able to complete the mission to Mars after a crash landing. The result was that further damage was done to the spaceships, together with extensive personal injuries and some fatalities.

The survivors were able to assess the damage, and with considerable effort and ingenuity they effectively built one spaceship from the wreck of the other two. They were even able to launch the reconstructed spaceship, but it was apparently not possible to carry

all of the personnel that had survived the original crash. The triumvirate that had been created at the beginning of the mission did survive, and they had the responsibility for making a decision as to who would be carried on the attempted return to earth.

For this purpose they input data into the spaceship's computer systems under a program that enabled it to determine who among all of the personnel were most essential to be aboard the spaceship for the attempted return to earth. All efforts were made to ensure that the criteria by which the selection would be made by the computer were determined as objectively as possible, but those persons who were not selected to return with the spaceship had to be abandonned on Mars with whatever provisions could be left to enable them to survive until a rescue mission could be effected. It was recognized by all persons that the chances of survival for those left on Mars were extremely slight and in fact, strong protests were made not only by those who were to be abandonned, but even by some of those who were to make the attempted return to earth.

With the help of the computers, the crew and the scientific personnel of the reconstructed spaceship attempted to balance the amount of food, air, water, and essential equipment that could be carried, having regard to the amount of fuel available, and the storage space on the spaceship.

Built into the computer program was an alert or warning system to signal the crew in the event that supplies of the necessities for life appeared to be running low to the point that there would not be sufficient for the crews' survival. If this did occur, the computer was programmed to recalculate the estimates; and to select a person or persons who were most expendable, to be jettisonned from the spaceship. This would only be done to ensure that some of the crew and scientific personnel could survive and return to earth. Again, the criteria for this selection was intended to be made by objective processes.

Unfortunately, the alert system in the computer signalled the necessity of sacrificing some of the personnel, and two crew members and three scientists, one woman and four men were identified. None of the five were from among the triumvirate that continued in command of the mission. Reluctantly, an order was given to jettison these five unfortunate persons before the problem worsened.

After a number of weeks of travel the spaceship successfully reached Earth's atmosphere and opened communications with observation posts in both the United States and Soviet Russia. The fact of the return of even one spaceship was regarded as being miraculous, and extraordinary efforts were made to guide the ship safely to a landing place. Unfortunately, the degree of control over the spaceship's flight path was minimal once it had entered the atmosphere of earth, but nevertheless the crew were able to land in safely. As it turned

out, the landing was in a remote part of what used to be called the Keewatin District in Northwestern Ontario.

Canadian authorities launched a rescue mission with personnel composed of military, scientific, and medical teams, which landed from helicopters in the immediate vicinity of the spaceship and as a precautionary measure, the entire area was quarantined by a special order of the Canadian Cabinet issued pursuant to the Emergency Measures Act.

Global reaction to the return of the heroic astronauts was universally joyful at first, but as information became more available to the public, concerning the tragic fate of those members of the mission who did not return, reactions became mixed. This was especially so among the members of the families of those who died. The latter put pressure on their respective governments to conduct a thorough investigation of the tragedies and to determine whether any culpability could be attached to the decisions that had been made by the triumvirate who were in command of the mission.

After it had been determined by the Canadian authorities that the quarantine could be relaxed, the spaceship's logs and computer tapes were turned over to a Russian-American delegation. The surviving astronauts were not consulted about the release of this vital data and in fact when they were informed of the step that had been taken they protested vigorously. Furthermore, in spite of their protests they were held in custody by Canadian Military authorities who referred to the detention euphemistically as "continued quarantine." In fact, the astronauts were being held in custody under orders issued by the Canadian Cabinet, whose decision was made at the request of the American and Soviet governments.

At this point, the astronauts demanded the right to consult lawyers, as is guaranteed by the Charter of Rights and Freedoms in the Canadian Constitution, and their request was granted, along with a commitment that the lawyers' fees would be paid by the government of Canada in consideration of all the extraordinary circumstances of the case.

After a number of consultations with their lawyers the astronauts made an application to Immigration authorities to be granted status as "landed immigrants" on the theory that they were stateless refugees and victims of shipwreck, in the same way that refugees from shipwrecks in previous centuries were sometimes granted the right to remain in the country of their rescuers.

Because of substantial pressure applied by both the American and Soviet governments to return the astronauts to their countries of origin, the Canadian Immigration authorities were extremely reluctant to grant the status of landed immigrants, and instead scheduled a hearing to determine whether they should be deported or whether they should be allowed to remain in Canada as they had requested. Counsel

on behalf of the astronauts argued that any order made under the Canadian Immigration Act to deport the astronauts must require that they be returned from whence they came, which would technically mean sending the astronauts back to Mars. They further argued that the astronauts ceased to be citizens of either Russia or the United States when they crash landed on the planet Mars because in all the circumstances they were forced to create an independent nation for their own mutual protection. It was argued that neither the American Government nor the Soviet Government could have provided any assistance or guidance to the astronauts after they had lost communication with them, and the latter were therefore not only entitled to create their own government and make their own rules, but in fact they had no alternative.

Further steps were taken by the American government to extradite those astronauts that were of American origin and thereby have them return to the United States to face trial for what was alleged to be crimes under American law. American authorities denied that their former citizens had any legal right to decide who should live or who should die, from among the personnel of the original mission. For these reasons an application by the American authorities was made to the Canadian court for an extradition hearing.

Counsel for those astronauts affected by the application for extradition defended their clients on the grounds that an extradition order would only be valid if the applicant could show that a crime that was covered by the Extradition Treaty between Canada and the United States had been committed within American jurisdiction. On this point they argued firstly, that if a crime had been committed at all, it was committed either on the planet Mars or in space, and American law had no valid application outside of American boundaries. Secondly, they argued that the spaceship which had been built from the wreckage of the original two spaceships could not logically be declared to be either an American ship or a Soviet ship and was instead the property of the surviving astronauts, based on an international Law of Salvage.

Counsel further argued that the only evidence of any crime having been committed anywhere was based on the information found in the log of the spaceship and its tapes, which the lawyers said was illegally taken away from their clients who in effect had been denied "due process of law." On behalf of the astronauts therefore the lawyers applied for an order of the court, based on the Canadian Charter of Rights and Freedoms, to deny the admissibility of the evidence obtained as described above.

Counsel also applied for a Court Order to Restore Possession of Property so as to require that the logs and tapes, the spaceship itself, and all its contents, be restored to the possession of their clients. Three judges of the Ontario Divisional Court issued an injunctive order which prohibited the Canadian authorities from

releasing this property to either the U.S., or to the Soviet authorities until the civil case had been tried. He ruled that the administrative decision to turn the property over without giving the astronauts the opportunity to present their side of the case was a denial of their fundamental right to a full and fair hearing, and was, therefore, procedurally flawed. As authority for their decision, they cited the Dominion Stores Pension Fund Case, which was decided in the same court in the summer of 1986.

A further application was made for an order of Habeas Corpus whereby the astronauts should be released from custody on the grounds that they were being illegally detained.

As a result of the investigations conducted by both the Soviet and American Governments, evidence was discovered that showed faults in the manufacture of important parts of the spaceships which were the cause of their failure to avoid the meteorites which damaged them.

Further evidence revealed that there was a flaw in the program that had determined how many persons could be safely carried in the reconstructed spaceship, and in fact it was determined that all of the personnel who had survived the crashes on Mars could have been brought safely back to earth, based on the availability of air, water, food, fuel, and space. There was no evidence to show that the faults in the computer programs were as a result of any deliberate misconduct, but carelessness was concluded to be a factor.

Having regard to all of the circumstances described in this case-study, students must be prepared to answer questions related to the issues of law which have been created by these facts. Some issues of law that should be considered are as follows:

1. The Law of Necessity

2. International Law concerning the jurisdiction of the Canadian, American, and Soviet Governments.

3. The Types of law that would be relevant in each stage of the proceedings and the court(s) which would have jurisdiction.

4. The Universal Declaration of Human Rights

5. The Canadian Charter of Rights and Freedoms

6. The Law of Property as it concerns the ownership of the reconstructed spaceship and all its contents.

7. The status of the astronauts insofar as they found themselves resident in Canada.

8. Criminal liability for homicide if any.

9. Civil liability for tort and/or negligence if any.

10. The procedures involved for bringing these cases before courts, or administrative tribunals.

11. The potential remedies or awards that may be given by Ontario Courts to any of the parties involved.

12. The legal and ethical questions arising from the use of computers to determine who should live, and who should die. (Do we over-emphasise the evidenciary value of: radar, breathalyzers, polygraph machines?
Will our next step be the use of: "thiefalyzers," "murdercators," or "treason-identifiers?"

A Canadian Press article written by Robert Ploskin and published in the London Free Press on March 17, 1987 quoted a computer expert who commented on computer programs as follows:

> "to accept their conclusions wholeheartedly is an act of "faith."

and

> "The danger lies not in the computer, but in the program written for it."

It is intended that copies of this case-study will be distributed to students at the beginning of a law course and that testing will take place periodically based on the extent to which the manuscripts of law which accompany the case study have been covered in class. Testing will be based on multiple choice questions generated by computer, and as the students progress through the manuscript, the complexity of the test questions will become greater because they will be based on increasingly complex resource material. For this purpose the testing will be based on specified chapters and units of study.

For example:

(a) questions based on Book One Chapters 1,2 - Introduction to Law

(b) questions based on Book One Chapters 3 (the Charter of Rights and Freedoms)

(c) questions based on Book One Chapter 4 - The Law of Property

(d) questions based on substantive law including:

(1)crimes (2)tort (3)Immigration Laws - (mostly found in Book Two)

(e) questions based on procedural or technical law relative to the conduct of the trials, and administrative hearings which are contemplated by the case-study - (Book One Chapter Five)

(f) f)complex questions based on any, of the above, or combinations of them.

SUMMARY

1. Computerized testing is far more advanced than is generally realized.

2. The Difficulty Levels of tests can be metered so as to meet standards fixed by educational institutions, qualifying standards for vocational and professional associations, and as required by industry. They can be maintained on local, regional, provincial, a Canada-wide scale, or world-wide.

3. Test Objectives can be far more extensive than is generally realized.

4. The creative use and effectiveness of case-studies, flow charts, schematics, diagrams and other illustrations are enhanced considerably without the complications that are sometimes incurred without computerization.

5. The correlation between "conventional" test results and computerized test results is remarkable.

6. Test marking and feedback for students are accelerated remarkably.

7. The frequency of testing can be increased without increasing teaching costs, or teachers' workload.

8. Student progress can be monitored much more closely than with conventional methods.

9. Student Records can be maintained up-to-date, more efficiently, and inexpensively.

10. Teacher evaluation can be much more objective, consistent, and constructive. Teacher accountability can be measured.

11. The economies are potentially astronomic, and these can be effected without reductions in quality.

12. The opportunities for productive class discussion are greatly enhanced when tests are taken up so quickly after they have been written. In the Socratic method of teaching, the instructor has to ask questions of the class. With this system, every student has a copy of the questions, and debate is easily provoked.

13. The opportunity to create comprehensive course outlines and study-guides is greatly enhanced.

14. Significant progress toward self-directed learning can be realized.

15. Remote learning and access to learning for handicapped persons is also a reality.

16. Table-top publishing can reach out to remote areas and bring copies of learning resources within the reach of millions of people who could not otherwise have access.